



MABEL photon-counting laser altimetry data in Alaska for ICESat-2 simulations and development

Kelly Brunt, Cryospheric Sciences, NASA GSFC, T.A. Neumann, Cryospheric Sciences, NASA GSFC, J.M. Amundson, University of Alaska Southeast, J.L. Kavanaugh, University of Alberta, M.S. Moussavi, CIRES, NSIDC, K.M. Walsh, Cryospheric Sciences, NASA GSFC, W.B. Cook, Mesoscale Atmospheric Processes, NASA GSFC, & T. Markus, Cryospheric Sciences, NASA GSFC

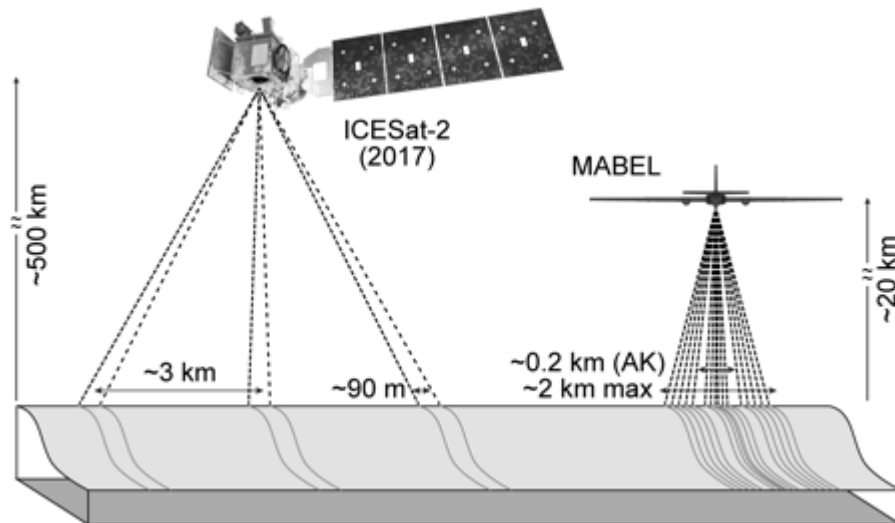


Figure 1

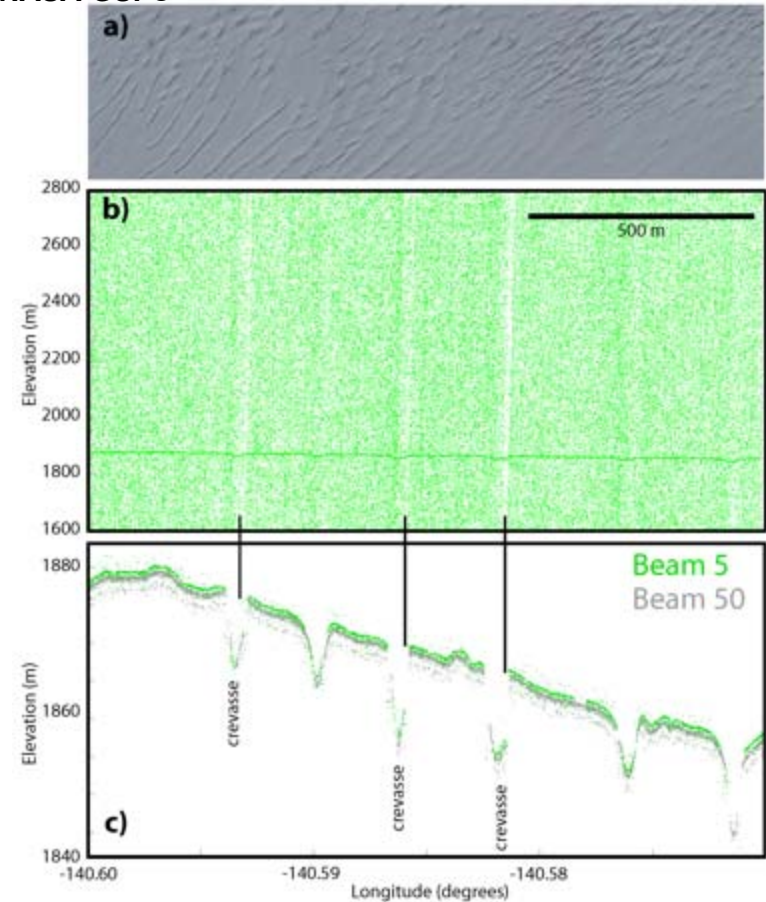


Figure 2

MABEL maps Alaskan crevasses in detail, using ~50% of the expected along-track ATLAS signal-photon densities over summer ice sheets.

ICESat-2 along-track data density, and spatial data density due to the multiple-beam strategy, will provide a new dataset to mid-latitude alpine glacier researchers.





Name: Kelly Brunt, Cryospheric Sciences, NASA GSFC
E-mail: kelly.m.brunt@nasa.gov
Phone: 301-286-5943

References:

This research '**MABEL photon-counting laser altimetry data in Alaska for ICESat-2 simulations and development**' will appear in *The Cryosphere*, 2016.

Data Sources: NASA ICESat-2 MABEL data:

(http://icesat.gsfc.nasa.gov/icesat2/data/mabel/mabel_docs.php); Landsat-8 OLI data; WorldView-2 imagery; in situ GPS data on icefields.

Technical Description of Figures:

Figure 1: Schematic ICESat-2 and MABEL beam geometry (dashed lines) and reference ground tracks (grey lines along ice-sheet surface). Each ICESat-2 beam pair consists of a strong and a weak beam (as indicated by the dash difference) for energy considerations. MABEL allows for beam-geometry changes with a maximum ground spacing of ~2 km at 20 km; for the 2014 AK deployment, the maximum ground spacing was 0.2 km (after Brunt et al., 2014).

Figure 2: MABEL camera and photon data over a heavily crevassed section of the Bagley Icefield, from the 16 July 2014 flight. (a) Stitched MABEL camera images. (b) MABEL signal and background photons for a 1200 m range that includes the glacier surface. (c) MABEL signal photons, indicating both the surface and the bottoms of crevasses.

Scientific significance, societal relevance, and relationships to future missions: MABEL is an ICESat-2 data simulator; results from the 2014 Alaska deployment suggest that the dense along-track sampling interval and narrow across-track beam spacing of MABEL (and therefore ATLAS) will provide a level of detail of mountain glaciers that has previously not been achieved from satellite laser altimetry.

